GSA Fleet®

FedFleet 2021

Electric Vehicles & Charging Stations

June 2021

Caitlin Dorame, GSA Fleet and Julian Bentley, DOE/Bentley Consulting

Agenda

1. GSA's FY21 Electric Vehicle Offerings
2. Infrastructure
3. FY22 & Beyond
4. The EV Industry Today
5. The Future of the EV Market

FedFleet 2021

GSA Fleet EV Charging Challenge

Winners

Overall - **Department of Interior**

Most Improved Utilization and MPG- **Corps of Engineers**

Most Utilized PHEV - **Army**

Most Utilized BEV - **Navy**

Most Engaged - **U.S. Coast Guard**

FedFleet 2021

Electric Vehicles

FedFleet 2021

Why Electric Vehicles?

Emissions Reduction	***Less fleet GHG emissions from use of electricity & cleaner grid***
Operating costs	***Lower fuel cost per mile and maintenance costs***
Support market development	***Lead by example in growing the electric vehicle market***
Performance & Tech	***Quiet, modern and connected*** ***Less vehicle downtime***

FedFleet 2021

Source: DOE

Federal Fleet Electrification Today

"We're going to turn [the Federal] Fleet into a fleet that's run on electric vehicles"
-President Biden

EO 14008: Tackling the Climate Crisis at Home and Abroad

Sec. 205. Federal Clean Electricity and Vehicle Procurement Strategy.

[GSA, CEQ, OMB, shall assist the National Climate Advisor to develop…]

(b) The plan shall aim … to achieve or facilitate:

(ii) clean and zero-emission vehicles for Federal, State, local, and Tribal government fleets, including vehicles of the United States Postal Service.

FedFleet 2021

FY21 Light Duty Sedan EVs

8E Chevy Bolt (BEV)
259 miles
Recharge: 10 hrs L2
Price: $26,739
Incr.: $8,928

8E Nissan Leaf (BEV)
150 to 226 miles
Recharge: 7.5 hrs L2
Price: $28,602; $33,541 (with AF1)
Incr.: $11,144

8p Hyundai Ioniq (PHEV)
29/620 miles
Recharge: 2.25 hrs L2
Price: $24,997
Incr.: $7,294

9E Tesla Model 3 (BEV)
263 to 353 miles
Recharge: 8 hrs L2
Price: $43,697; $52,7871 (with IE1)
Incr.: $25,717

10E Tesla Model S (BEV)
412 miles
Recharge: 9 hrs L2
Price: $85,663
Incr.: $55,435

FY21 Light Duty SUV EVs

98E Hyundai Kona (BEV)
258 miles
Recharge: 9 hrs L2
Price: $35,593
Incr.: $15,409

91E/96E Ford Mach-E (BEV)
230-300 miles
Recharge: 14.1 hrs L2
Price: $41-$44,007
Incr.: $18,501/$19,599

96E Tesla Model Y (BEV)
326 miles
Recharge: 9 hrs L2
Price: $55,845
Incr.: $31,043

105E Tesla Model X (BEV)
360 miles
Recharge: 10 hrs L2
Price: $95,707
Incr.: $65,942

98F Hyundai Nexo (FCEV)
380 miles
Price: $44,007
Incr.: $19,559

98P Kia Niro (PHEV)
26/560 miles
Price: $28.810
Incr.: $8,625

98P Ford Escape (PHEV)
38/530 miles
Price: $28.985
Incr.: $8,800

96P Mitsubishi Outlander (PHEV)
24/320 miles
Price: $33,760
Incr.: $8,981

20P Chrysler Pacifica (PHEV)
32/520 miles
Price: $37,011
Incr.: $12,396

FY21 Medium & Heavy Truck and Bus Offerings

Class 8 Trash Truck
Global Enterprise/MOTIV
105 mile range
$937,128
GSA MAS

Class 6 Delivery Van
Global Enterprise/MOTIV
105 mile range
$407,447
GSA MAS

Class 4/6 Box Truck
Global Enterprise/MOTIV
105 mile range
$325-$393,866
GSA MAS

Class 4/6 Stake Bed Truck
Global Enterprise/MOTIV
105 mile range
$305-373,498
GSA MAS

Class 8 Stake Bed Truck
Global Enterprise/MOTIV
105 mile range
$676,468
GSA MAS

ZEUS 305 SHUTTLE BUS
Phoenix Motor Cars LLC
100 mile range
$263,733
GSA MAS

Class 6 35-40 pax Bus
Global/MOTIV Power Systems
105 mile range
$475,355
GSA MAS

35-40 Ft Catalyst E2
Proterra
250+ mile range
$660,574-771,869
GSA MAS

16-20 pax Bus
TESCO/Turtle Top Terra/MOTIV
105 mile range
$214,955-$221,988
AutoChoice

Electric Prisoner Transport Bus
Global/Capitol Coachworks/MOTIV
105 mile range
$352-$363,637
GSA MAS

Infrastructure

GSA Fleet's Infrastructure Offerings

- Precompeted BPA (gsa.gov/evse)
  - Level 1, 2 & DC Fast
  - 5 manufactured products
  - Prices 30% below market price
  - Single and dual ports, wall and pedestal mounted
    - Fair opportunity already given through BPA (FAR 8.405-3)
    - Select Lowest Priced model within desired CLIN and place order directly with vendor

FedFleet 2021

EVSE Manufactured Products on Schedule

- Aerovironment (L1, L2)
- Beam/Solar (L1, L2)
- Bosch (L2)
- ChargePoint (L2, DCFC)
- Clipper Creek (L2, DCFC)
- Efacec (DCFC) BPA
- ElectricMotorWerks
- EvoCharge (L2)
- EVSE LLC (L2) BPA
- Garage Juicebar (L2) BPA
- Hubbell WD (L2)
- IDEAL Shield LLC
- Leviton (L2) BPA
- Pep Stations (L2)
- Proterra (DCFC)
- Schneider Electric (L2)
- Siemens (L2)
- Telefonix (L1) BPA

FedFleet 2021

EV by Recharging Time

MY2021 Electric Vehicle	All Electric Range/Total Range	Level 1/120V Recharge Time (hours) *	Level 2/240V Recharge Time (hours)**	DC FAST (62.5 kW) Recharge Time (hours)***
Nissan Leaf (BEV)	149	30	8	1.8
Chevy Bolt (BEV)	259	64	9	2.4*
Kia Niro (PHEV)	26/560	9	2.25	N/A
Chrysler Pacifica (PHEV)	32/520	11	2	N/A
Mitsubishi Outlander (PHEV)	*22/310*	8	*3.5*	*25 minutes*
Mustang Mach-E (BEV)	*211-300*	Up to 95 hours	*14*	*1 hour*
Hyundai Kona (BEV)	*258*	Up to 60 hours	*9*	*1 hour*
Ford Escape PHEV	38/530	10	3.5	N/A

FedFleet 2021

2-5 miles of range per hour. Charging cord provided. Plug into existing outlet or station

***10-20 miles of range per hour**.2-10 hours for full charge. Stations can collect data.*

****60-80 miles of range per 30 mins**. Full charge in 30 minutes-1 hour.*

Partnership & Planning

FedFleet 2021

Fleet Electrification Partnership & Roles

GSA

- Pursing new EV offerings and Infrastructure contracting actions
- Leveraging partnership with Public Building Service
- Sharing Best Practices
- Customized data analysis for FY22 planning and beyond

Agency

- Begin budgeting, planning & engaging with agency leadership
- Develop internal policies
- Attend interagency working group meetings
- Request customized analysis
- Join GSA to electrify your fleet!

FedFleet 2021

Planning for Electrification

Step 1

Take inventory of your fleet

What vehicles are nearing replacement and where are they; what is usage pattern; where is existing infrastructure

Step 2

Evaluate, Plan, Budget

Which locations need what type of infrastructure; how will it be funded? Plan for each location or at least create a blueprint for each type of situation

Step 3

Acquire EVSE; Contract for Installation

Ensure you have a plan for each location and/or delegate to knowledgeable local site or region-specific POCs

Step 4

Buy EVs, Install, Educate

Buy EVs; Install the charging stations and utilize resources to help drivers get comfortable driving EVs and using EVSE

Learn More!

EV-related Sessions:

- ***Electric Vehicles and Charging Stations*** *- Tuesday 3:30 PM ET* 
- **Fleet Analysis for EV Suitability** - Wednesday, June 9 at 2:00-3:00PM ET
- **Electric Vehicle Panel** - Wednesday, June 9 at 3:30-4:30PM ET
- **EVSE Infrastructure Siting & Costs -** Thursday, June 10 12:30PM-1:30PM ET

FedFleet 2021

Contacts & Resources

GSAFleetAFVTeam@gsa.gov

gsa.gov/AFV

gsa.gov/EVSE

FedFleet 2021

U.S. DEPARTMENT OF ENERGY

Office of ENERGY EFFICIENCY & RENEWABLE ENERGY

FEMP

Federal Energy Management Program

FedFleet 2021

The Electric Vehicle Market

Trends Shaping the EV and EVSE Market

Julian Bentley, Bentley Energy Consulting

June 2021

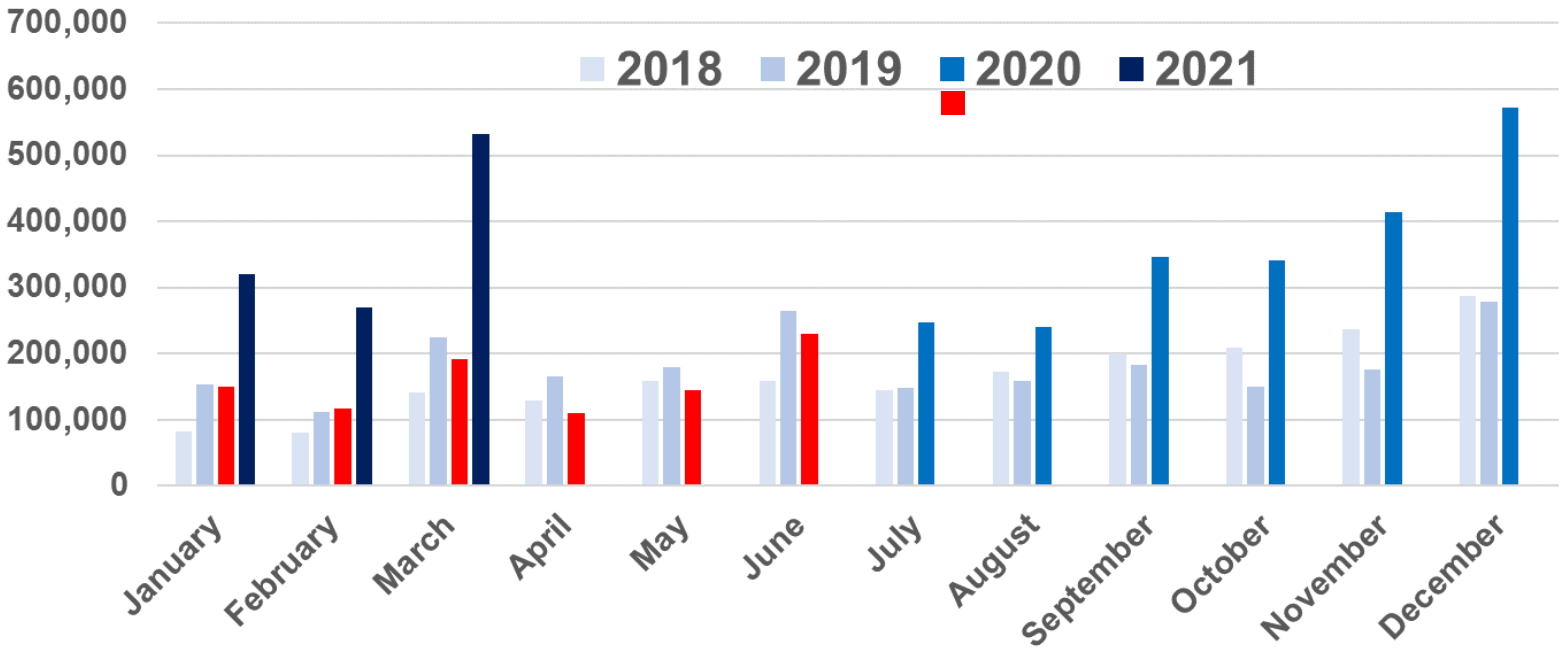
The Electric Vehicle Market Agenda

1. Current U.S. EV Market
2. Market Segmentation
3. Current U.S. Charging Infrastructure
4. Recent EV Market Developments

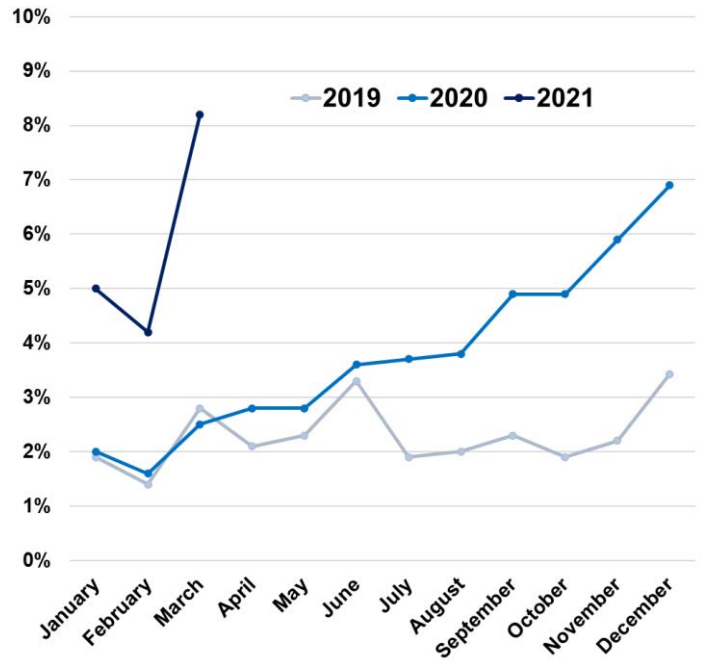
FedFleet 2021

Global EV market finished 2020 strong

Global Monthly Plug-in EV Sales (2018 to Present)



Global Monthly Market Share (2018 to Present)

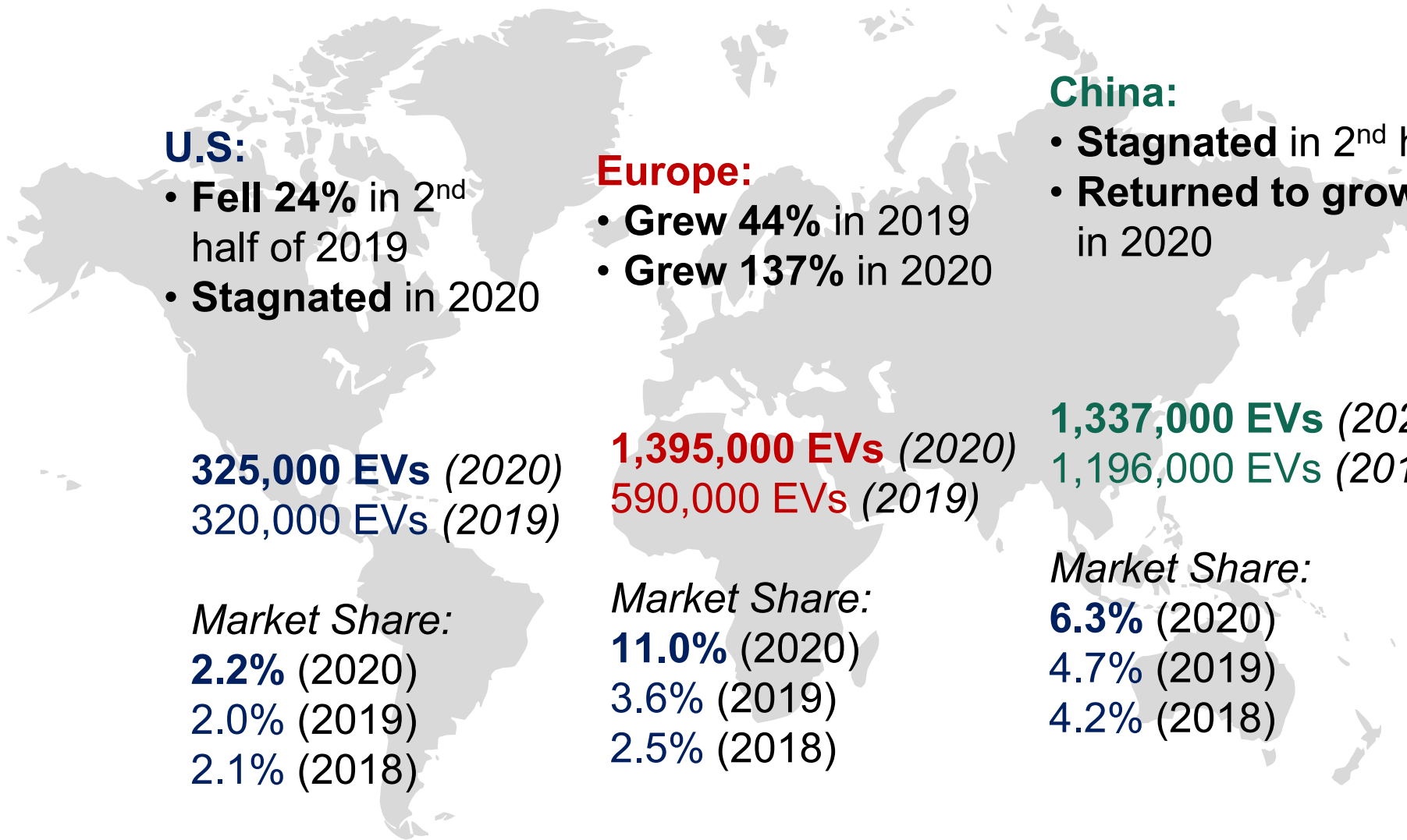


- **Global EV sales grew 43%, from 2.26 million in 2019 to 3.24 million in 2020**
- **EV sales recovery accelerated in 4th quarter of 2020 and 1st quarter of 2021**
- EV market increased as global light vehicle market decreased by 14% in 2020

Bentley Energy Consulting

Source: EV-sales.blogspot.com

Growth rates in the three major EV markets varied



U.S:
- **Fell 24%** in 2nd half of 2019
- **Stagnated** in 2020

325,000 EVs *(2020)*
320,000 EVs *(2019)*

Market Share:
2.2% (2020)
2.0% (2019)
2.1% (2018)

Europe:
- **Grew 44%** in 2019
- **Grew 137%** in 2020

1,395,000 EVs *(2020)*
590,000 EVs *(2019)*

Market Share:
11.0% (2020)
3.6% (2019)
2.5% (2018)

China:
- **Stagnated** in 2nd half of 2019
- **Returned to growth (12%)** in 2020

1,337,000 EVs *(2020)*
1,196,000 EVs *(2019)*

Market Share:
6.3% (2020)
4.7% (2019)
4.2% (2018)

Bentley Energy Consulting

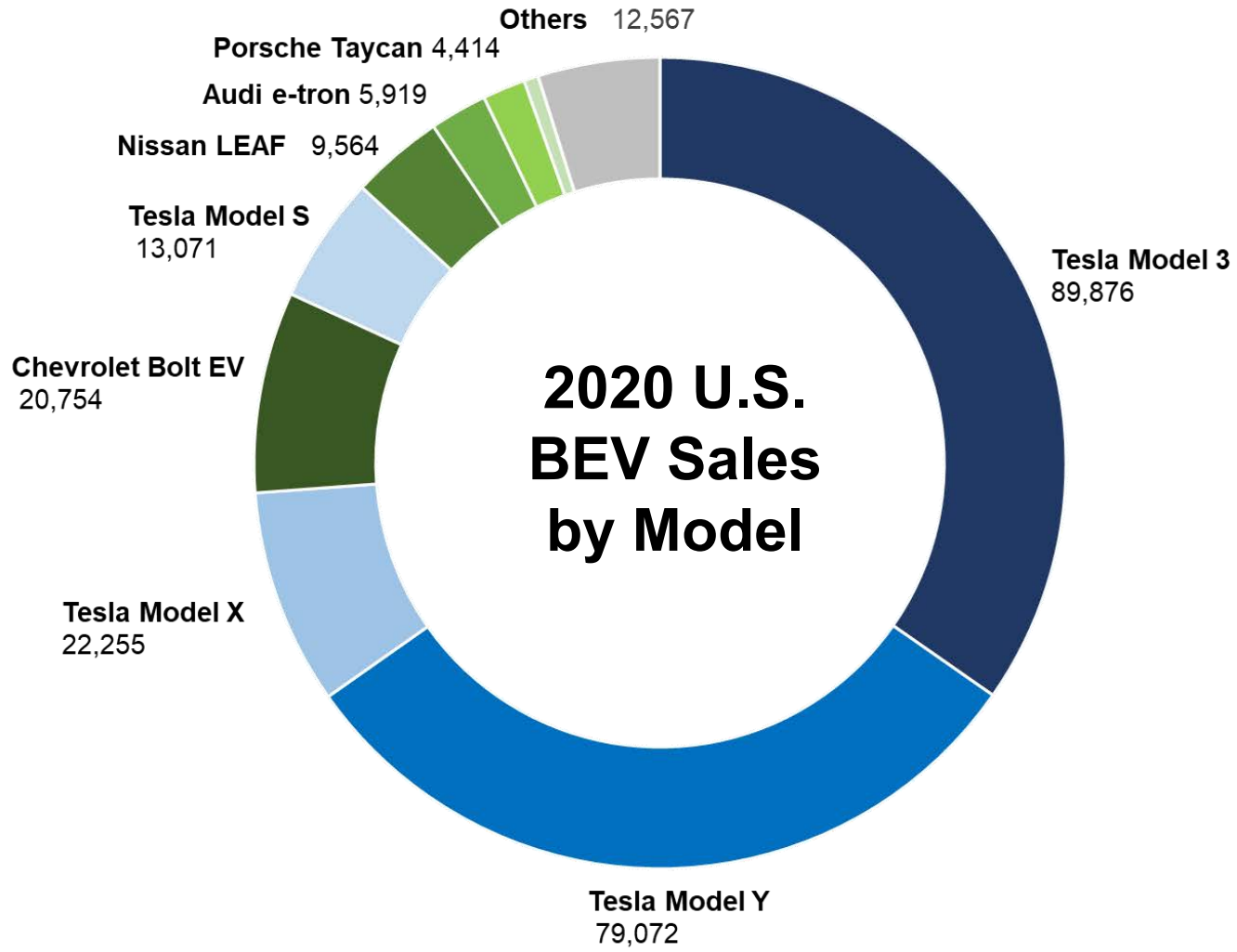
After weak 2019, U.S. EV sales in 2020 were flat but accelerated at end of year

U.S. Electric Vehicle Sales by Quarter (2018 to 2021)

- EV sales increased from **320,000 in 2019 (2.0% share) to 325,000 in 2020 (2.2% share)**
- EV sales in first half of 2020 **significantly impacted by COVID**
- **BEV sales increased 10% year-over-year** (259,000 vehicles in 2020)
- **PHEV sales fell 22% year-over-year** (66,000 vehicles in 2020)
- **Market share increasing up to 2.9%** in 4th quarter 2020 and **3.2%** in 1st quarter of 2021
- **Ford Mach-E release and increase in Tesla Model Y production** driving sales growth

Sources: InsideEVs, Argonne National Laboratory, U.S. Bureau of Economic Analysis,

U.S. BEV market dominated by Tesla (Model 3/Y)



BEVs

80%

259,000 vehicles

PHEVs

20%

66,000 vehicles

Tesla Models 3 and Y comprise **65% of BEV sales** and **52% of all EV sales**

Tesla Overall represents **79% of BEV sales** and **63% of all EV sales**

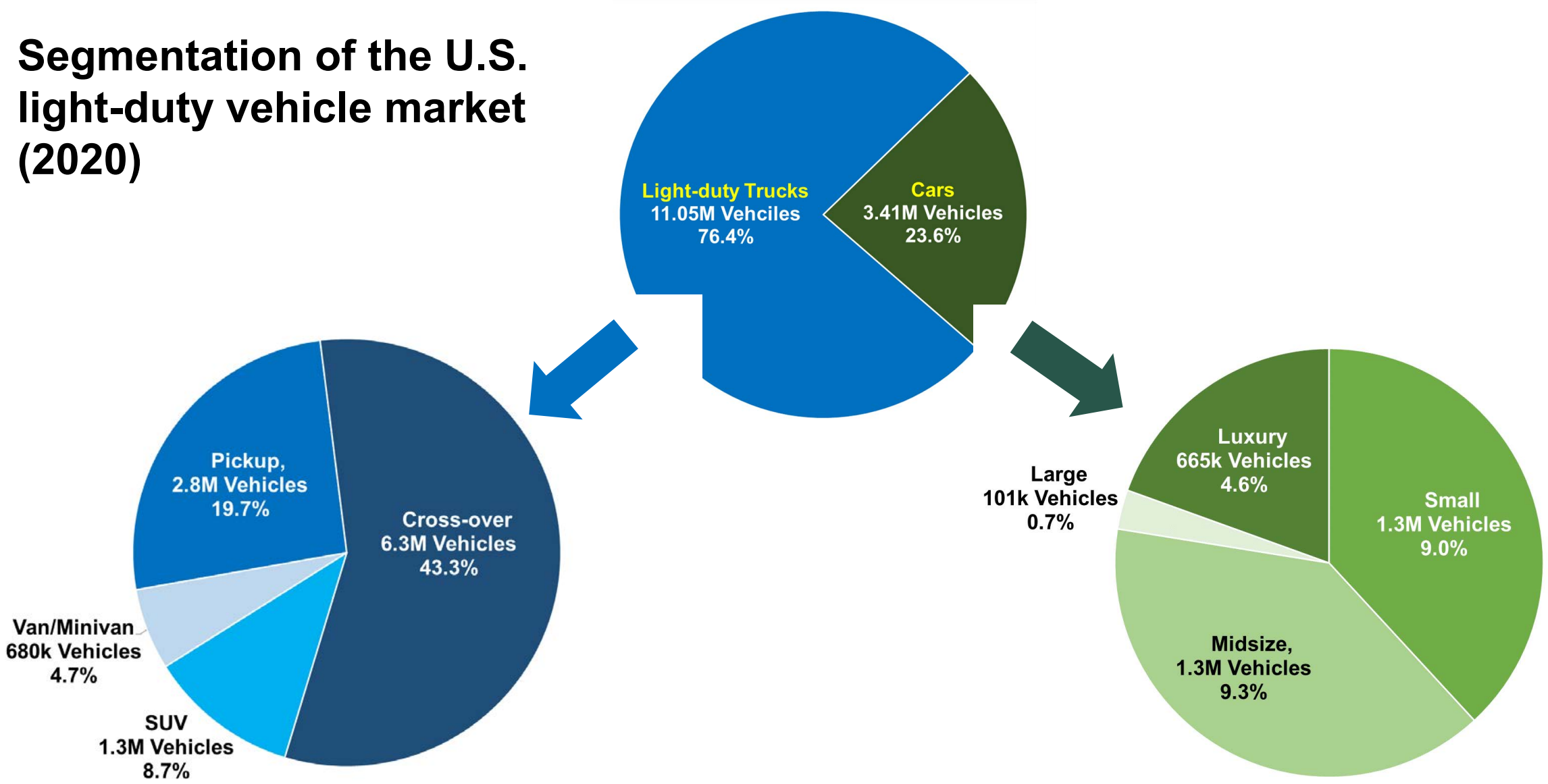
Bentley Energy Consulting

Market Segmentation

FedFleet 2021

U.S. Auto Market: Segmentation

Segmentation of the U.S. light-duty vehicle market (2020)



What types of vehicles comprise the Federal Fleet?

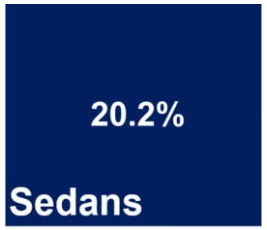
FY20 Federal Fleet Composition by Vehicle Type (Excluding USPS)

- Three primary vehicle types (***Sedans, LD Pickups, LD SUVs***) represent ˜60% of non-USPS fleet
- Roughly 84% of USPS fleet are LLVs and MD Vans
- Other USPS vehicle types are LD Minivans (8.1%), sedans (2.9%), and HD (3.0%)

LD Other, 0.3% Ambulance, 0.2%

Bentley Energy Consulting

Current available EVs from GSA by vehicle type

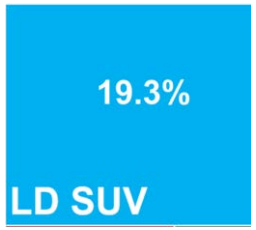


Sedan BEVs

Chevy Bolt	$26,648	259 mi.
Nissan Leaf	$28,885	149/226 mi.
Tesla Model 3	$43,697	263 mi.
Tesla Model S	$85,663	412 mi.

Sedan PHEVs

Hyundai Ioniq	$24,997	29 mi.



LD SUV BEVs

Ford Mach-E *4x2*	$41,799	230/300 mi.
Kona Electric	$35,946	258 mi.
Ford Mach-E *4x4*	$44,442	211/270 mi.
Tesla Model Y *4x4*	$55,845	326 mi.
Tesla Model X	$95,707	360 mi.

LD SUV PHEVs

Outlander	$33,760	22 mi.
Ford Escape	$29,272	38 mi.
Kia Niro	$29,096	26 mi.

LD SUV PHEVs

Pacifica	$37,011	32 mi.

Shuttle and Transit Bus BEVs

Ford E450	$214k+	105 mi.
Proterra	$660k+	240 mi.

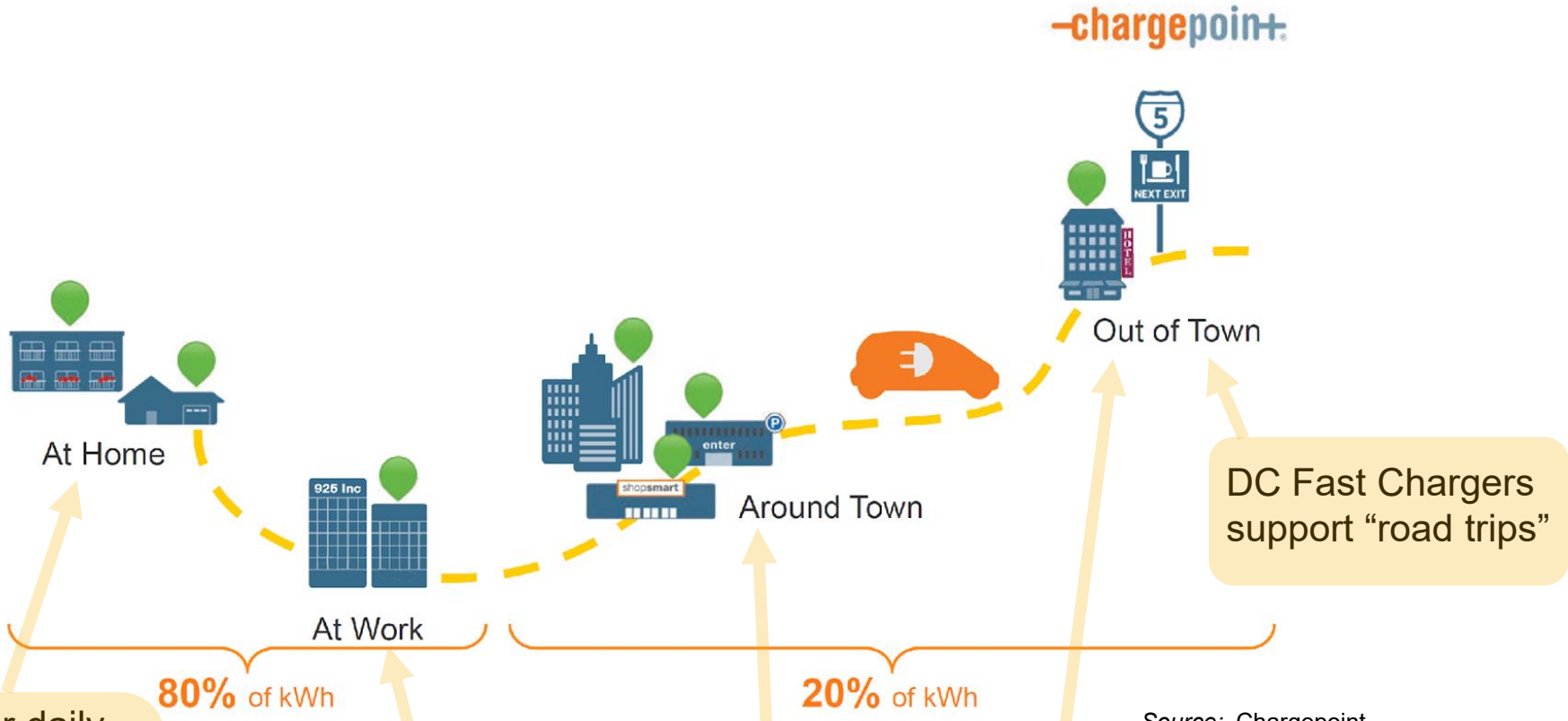
No EVs currently available for: LD Pickups, MD pickups, HD, MD Vans, MD other, LD Vans, MD SUV

52% of Federal Fleet (Excluding USPS

Current U.S. Charging Infrastructure

FedFleet 2021

Building out an EV charging network



Source: Chargepoint

Used for daily "fill-ups"

Available at 50% of households

Used for "top-ups"

Helps drivers with limited access to home charging

Provides same transportation freedom as an ICEV

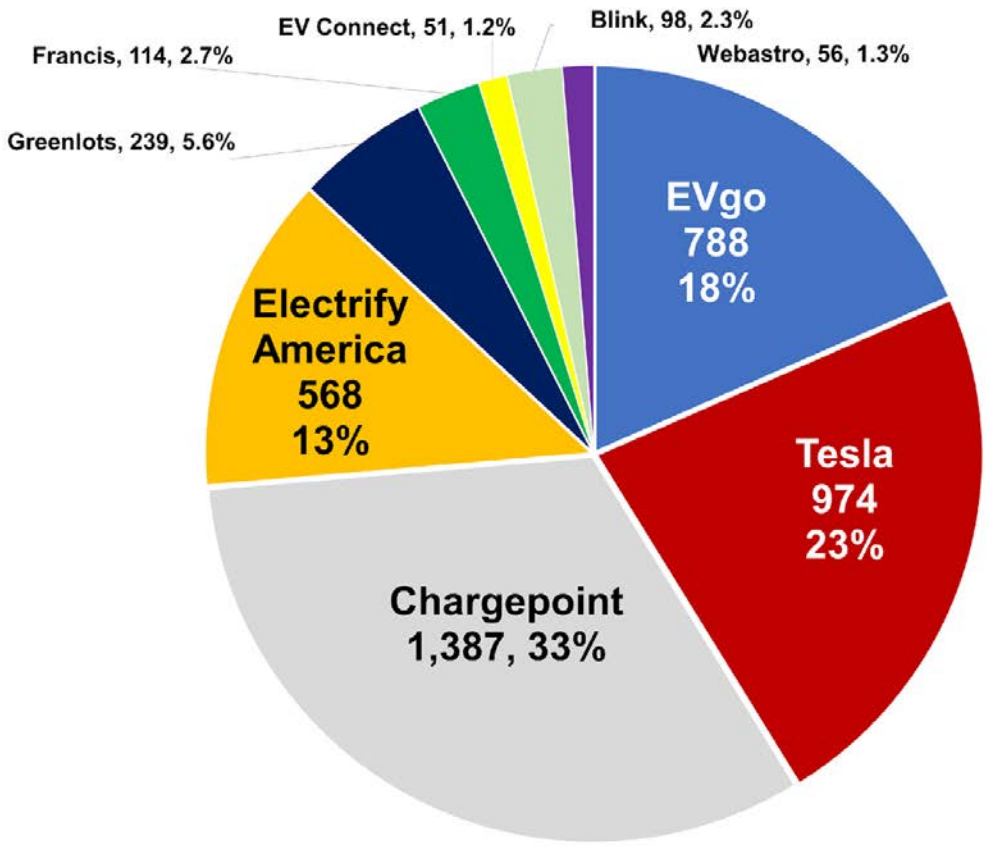
Relieves "range anxiety" concerns

DC Fast Chargers support "road trips"

Bentley Energy Consulting

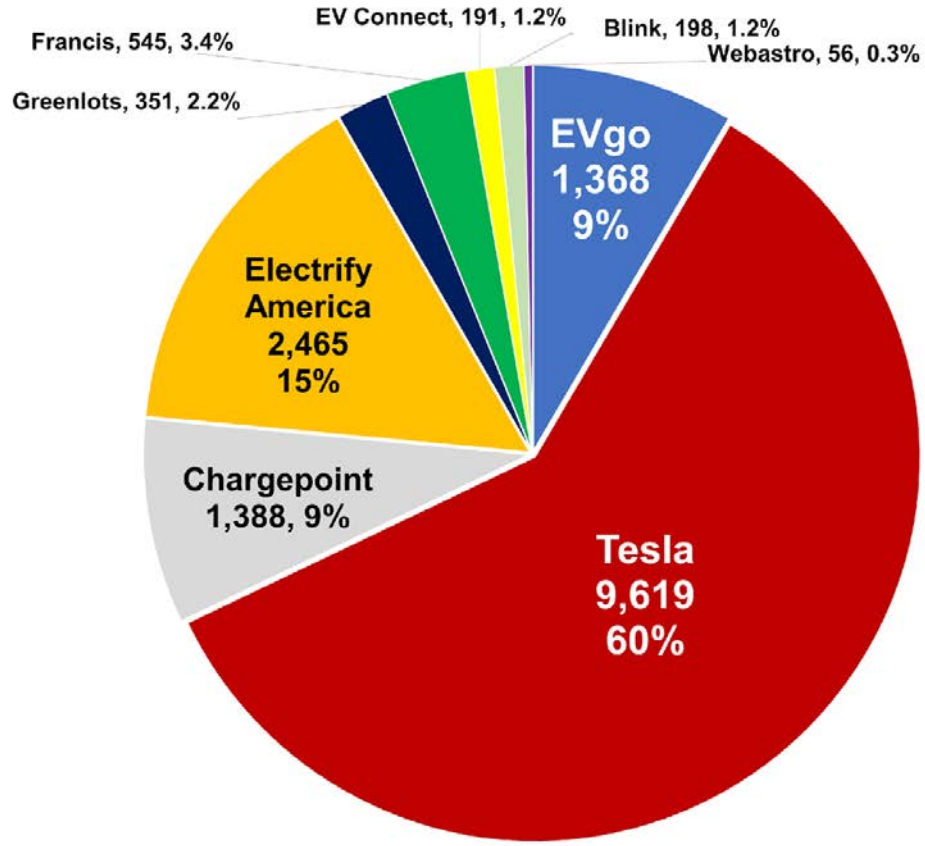
Tesla, ChargePoint, Electrify America and EVgo dominate public DC fast charging

U.S. DC Fast Charging Stations by Network (3/21)



Total: 4,902 Stations

U.S. DC Fast Charging Outlets by Network (3/21)



Total: 17,128 Outlets

OEMs establishing charging networks

- Partnering with EVgo to build a network of 2,700 DC Fast charging stations
- Chargers will run on 100% renewable energy
- Providing EVgo OnStar usage data to figure out where to put chargers

- Partnering with with Greenlots to develop the FordPass Charging Network (13,500 charging stations and almost 40,000 individual plugs)
- Bringing together multiple charging providers (e.g., Electrify America)
- FordPass Power My Trip adds chargers to trip planning

- Tesla has focused on developing its own Supercharger network nationwide
- Easy to use; just plug in
- Leads OEM's with largest network of high-power DC Fast Chargers
- EVgo installing Tesla plugs at 400 legacy stations and 200 new stations

- VW constructing the Electrify America network as part of settlement
- Software creates complicated process to link charger to vehicle
- Size of network still limited

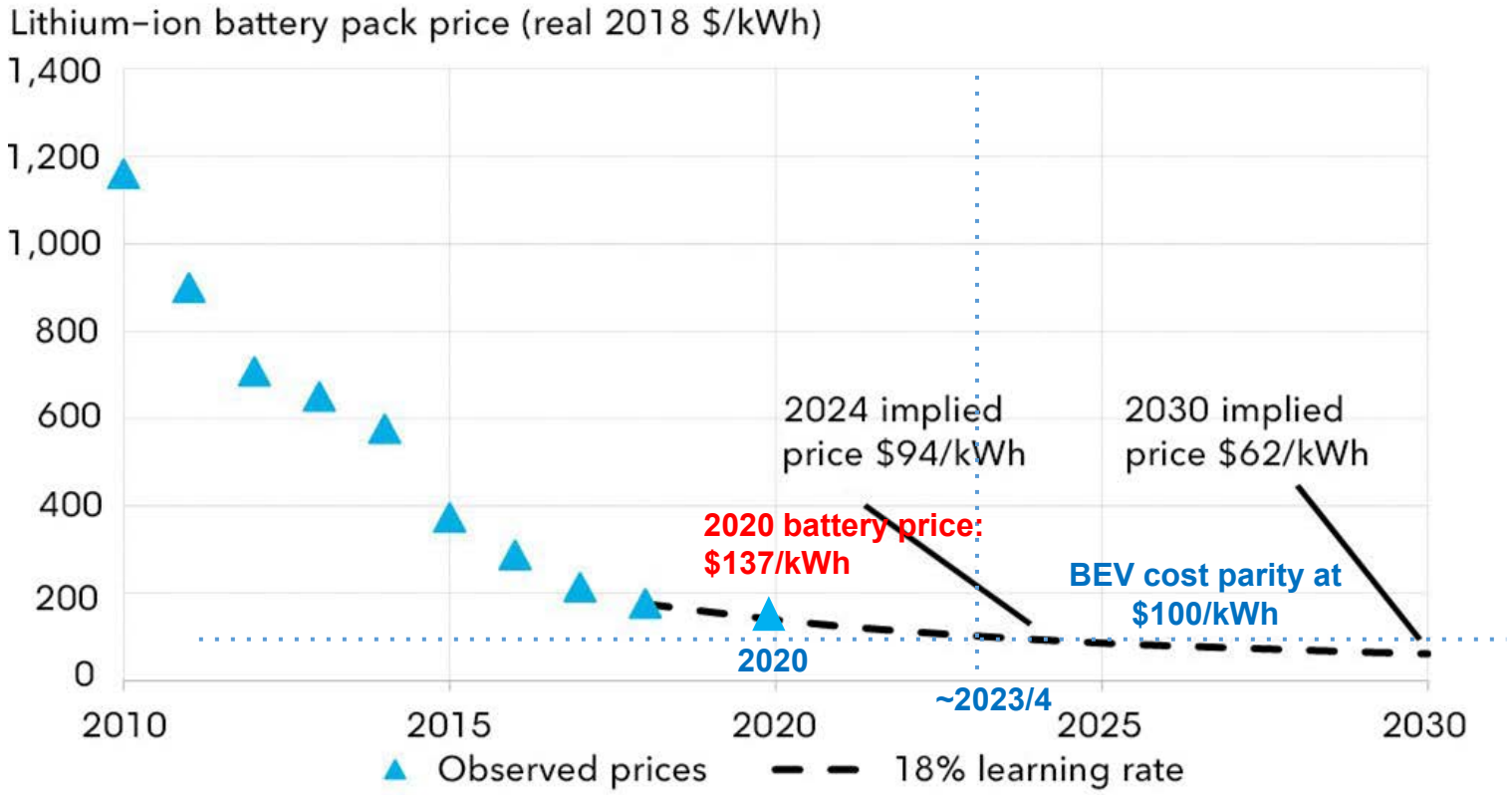
Recent EV Market Developments

FedFleet 2021

EVs: Factors driving EV adoption

1. **Cost parity.** Falling battery prices will help BEVs achieve acquisition cost parity with conventional vehicles.
2. **EV availability across vehicle types.** The availability of electric vehicle models across vehicle classes.
3. **Increasing EV capabilities.** The range of available BEVs and how quickly they can be recharged.
4. **Availability and convenience of EV charging stations.** The availability and convenience of charging infrastructure near home, around town, and along travel corridors.

Falling battery prices will help BEVs achieve cost parity



Source: Bloomberg New Energy Finance

- As orders increase, per kWh costs for batteries are falling faster than expected (18% per doubling of manufacturing capacity)
- 2020 year-end price estimated at $137/kWh
- Average battery energy density expected to almost double by 2030 to over 200 Wh/kg
- **At roughly $100/kWh, battery electric vehicles achieve cost parity with ICEVs**
- **BNEF analysts said they expect battery makers to hit $101/kWh in 2023**

Bentley Energy Consulting

New federal policy: *Biden Administration*

Day One

Government fleet acquisition of electric vehicles

Using the Federal government procurement system, implement policy to purchase electric vehicles for federal, state, tribal, postal, and local fleets

New CAFE standards that exceed Obama administration standards

Develop new fuel economy standards aimed at ensuring 100% of new sales for light- and medium-duty vehicles will be electrified

First Year Legislative Agenda

Major public investments in charging infrastructure

Deploy more than 500,000 new public charging outlets by the end of 2030

Remove limitations on electric vehicle federal tax credit

Eliminate current phase out of the EV tax credit

Focus on domestic jobs

Support domestic manufacturing on EVs and batteries

Major questions for U.S. market growth

1. Is the U.S. consumer ready to adopt EVs? Are we going to “crush Norway”?

2. Is “big auto” able to make an innovative EV that can compete with Tesla?

3. Is the rise of Rivian and Lucid a threat to Tesla?

4. Will new entrants to the EV segment drive increased consumer acceptance of EVs?

5. Will battery and chip supply issues limit EV sales in the short term?

GM's electrification strategy

- Plans to **exclusively offer EVs** by 2035
- **GM investing $27B into EVs and autonomous cars**
- **30 EV models expected by 2025**
- **Developing "Ultium" batteries** with LG Chem
- **Also expanding production in Mexico** (SUV, Honda partnership)

Announced Domestic Production

Factory ZERO (old Detroit-Hamtramck assembly plant) in *Detroit and Hamtramck, Michigan*

- GMC Hummer EV and SUV
- Chevrolet Silverado
- Cruise Origin (autonomous)

Orion Assembly in *Orion Township, Michigan*

- Chevrolet Bolt EV, Chevrolet Bolt EUV

Ultium Cells LLC in *Lordstown, Ohio*

- Ultium manufacturing plant (with LG Chem)
- 30+ GWh annually, starting in 2022

Spring Hill Complex in *Spring Hill, Tennessee*

- Ultium manufacturing plant (with LG Chem) starting in late 2023
- Cadillac Lyric

Ford's electrification strategy

- **Ford doubled investment to $22B** in EVs through 2025
- Investing in segments where it's "the dominant player."
- Mustang **Mach-E manufactured in Mexico**
- **F150** to be **domestically sourced and manufactured**
- **Plans for Ford and Lincoln SUV** produced in Mexico

Using Existing Brands to Attract EV Consumers

Ford F150 Lightning (early 2022)

- F150 ***best selling LDV*** (787k sold in 2020)
- Price and capabilities **game changer**?
  - — $39,974, 230 miles range
  - — 9.6 kW of power available for offboarding
- Domestically sourced and built
  - — Production in Dearborn, MI
  - — Batteries from SK Innovation Plant in Georgia
- First year production limited (80,000)

Ford Mustang Mach-E (Currently Available)

- Mustang ***best selling sports car*** (61k sold in 2020)
- Affordable with premium for range
  - — $42,895, 230 miles range
  - — $52,000, 300 miles range
- Foreign sourced and built
  - — Production near Mexico City
  - — Batteries produced by LG Chem in Poland
- First year production limited (50,000)

Tesla’s electrification strategy

- **Expanding production capacity** in U.S., China, and Germany
- **New Model Releases:** Model Y, Cybertruck, Semi, Roadster
- Improving battery ranges and expanding charging network

Model Y

- Annual sales in U.S. potential for 300,000 vehicles
- Focuses on the **large and growing crossover segment**
- Tesla **expanding production capacity** in U.S., China, and Germany
- Model Y release in European and China markets

Cybertruck

- Cybertruck "**pre-order reservations" already exceed 1,000,000**
- Electric trucks provide **improved capabilities** over petroleum powertrains
- **Unique design** may limit sales to traditional truck consumers

Other automakers electrification strategies

- **FCA**
  - **Has been a laggard** in transition to electric vehicles
  - Recently developed **plug-in hybrid Jeep Wrangler** SUV
  - Electrification strategy focuses on **Jeep, Maserati, and Fiat 500**

- **Rivian**
  - **New U.S. manufacturer** focused on electric trucks/SUVs
  - **Rivian R1T/R1S:** $69,000 cost with 400+ miles of range
  - **30,000 pre-orders** for 2021 release

- **Vokswagon**
  - **I.D. 4:** cost competitive offering in **large crossover segment**
  - **Battery plant in Georgia** annual capacity for 120,000 to 160,000 BEVs

- **Lucid**
  - Air sedan “next generation” performance/efficiency (4.5 miles/kWh)
  - Mission to make sustainable mobility, more widespread adoption

Other automakers electrification strategies cont.

- Hyundai
  - New **Electric-Global Modular Platform (E-GMP),**
  - 800-volt high-speed and bidirectional charging capabilities
  - Plans to produce 23 BEVs by 2025
  - New releases include **Ioniq-5 SUV and Ioniq-6 sedan**

- Honda
  - Discontinued Clarity BEV
  - **Signed M.O.U. with GM to use Ultium batteries**
  - Plans for **Honda EV in 2023** at a GM plant in Mexico, and an **Acura EV in 2024** at the GM plant in Tennessee

- Toyota
  - Developed **e-TNGA platform for EVs (with Subaru)**
  - Production possibly in China and Japan
  - FirstofToyota's"BeyondZero"EVs, bZ4Xcrossover,tobe released in mid-2022
  - Planning for 15 BEVs by 2025

Contact Info

Julian Bentle
Managing Direc
Bentley Energy
julian@bentleye
703.585.6977

FedFleet 2021

Questions?

GSA Fleet

GSAFleetAFVTeam@gsa.gov

Vehicles: gsa.gov/AFV

Charging Stations: gsa.gov/EVSE

Station Locator: AFDC.energy.gov

Julian Bentley
Managing Director
Bentley Energy Consulting
julian@bentleyenergy.com
703.585.6977

FedFleet 2021